

**R E P O R T on Sanitary Matters
in the Districts of Rivière du
Rempart and Flacq.**



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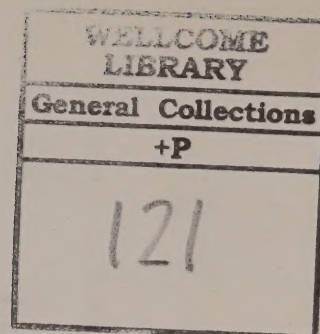
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REPORT

ON SANITARY MATTERS IN THE DISTRICTS OF RIVIÈRE DU REMPART AND FLACQ

No. 208/R/80

GOVERNMENT HOUSE,
PORT LOUIS,
20th August 1921.

THE HONOURABLE THE COLONIAL SECRETARY.

SIR,—On the conclusion of my inspections in Grand Port and Savanne attention was directed to the districts of Rivière du Rempart and Flacq regarding which I have the honour to report as follows :

RIVIÈRE DU REMPART.

In this District the inspections comprised :

TOWNS AND VILLAGES.—Grand Baie, Sottise, Grand Gaube, Poudre d'Or, Goodlands, Camp Maçon, Le Ravin, Belle Vue, L'Amaury, Rivière du Rempart, Pointe aux Lascars and Hermitage.

SUGAR ESTATES.—Beau Séjour, Labourdonnais, Mon Loisir (Rouillard), St. Antoine, Baudot, The Vale, Belle Vue, Mon Loisir (Adam) and Schœnfeld.

SCHOOLS.—Government School, Grand Baie ; R. C. Aided School, Cap Malheureux ; R. C. Aided School and Presbyterian Aided School, Grand Gaube ; Government School, Poudre d'Or ; R. C. Aided School, Goodlands ; Government School, Camp Maçon ; R. C. Aided School, Rivière du Rempart.

HOSPITALS.—Government Hospital, Poudre d'Or and Estates Hospitals.

DISPENSARIES.—Grand Baie, Poudre d'Or and Le Ravin.

RAILWAY STATION.—Poudre d'Or.

SPECIAL WATER SUPPLIES.—Sottise, La Cave, Ruisseau Grand Marais.

ENGRAIS.—Mon Loisir.

SPECIAL INSTITUTIONS.—Labourdonnais, Beau Séjour, Banwooharry and Ranghall Bhagun Butter Factories ; Von Moltke Rum Distillery.

Various rivers, rivulets, canals, swampy areas, and anti-malarial works were also inspected.

The following memoranda have already been submitted :—

174/R/62 of 28.7.21. Water Supply, Poudre d'Or ;

180/R/64 of 1.8.21. Water Supplies, Grand Gaube and Roche Noire ;

181/R/65 of 1.8.21. Hospital, Poudre d'Or ;

198/R/73 of 13.8.21. Hospital, Schœnfeld Estate.

The District of Rivière du Rempart differs in several respects from any of the other districts in Mauritius. Its rainfall is small, it is not nearly so much wooded, it is much less hilly and it is not nearly so well watered. As a result of the comparatively dry conditions the incidence of ankylostomiasis is less than in the rainy districts. Kendrick places it at 53.4 per cent. and, save in certain limited areas, malaria is not very prevalent. Influenza and dysentery appear to be the chief communicable diseases, the former undoubtedly aggravated by the bad housing conditions, the latter associated with contaminated water supplies and faulty methods of conservancy. The pail system is less in evidence than in other districts, pit latrines being common. If these were properly constructed and managed they would be better than a bad pail system but as a rule they are far from satisfactory and afford facilities for fly-breeding. They can however be greatly improved at a comparatively moderate cost and an account of the type recommended for use, more especially in connection with schools and other institutions, will be found under the summary of recommendations at the end of this report. Many of the villages are not "proclaimed" and so possess no sanitary system whatever.

The Sanitary Staff is represented by a Sanitary Warden who at present happens to be the Chief Sanitary Officer in Mauritius and has Flacq, Moka and Pamplémousses also under his care, a single Sanitary Inspector and 2 Sanitary Guards who are responsible for the sanitary welfare of a population of 31,692, and who, as is the case with the subordinate sanitary staff elsewhere, have to carry out work for four separate government departments, an impossible state of things. Under existing conditions the Sanitary Inspector

Rivière du
Rempart.

List of
inspections.

Memoranda
already
submitted.

General
conditions in the
districts.

Sanitary Staff.

takes months to get round his district for it must be remembered that unless his inspections are of an intensive nature their value is greatly diminished. Detailed sanitary work is slow work and yet it is essential.

Grand Baie.

GRAND BAIÉ is a scattered village of 608 inhabitants. Malaria and influenza are said to be the prevailing diseases. The chief points to be noted regarding it are :—(a) The insufficiency of the water supply ; (b) The presence of extensive marshes.

Water Supply.

(a) There are two public fountains supplying piped water from a well operated chiefly by a windmill pump and situated at "Sottise." The local wells furnish brackish water. The villagers complain that when there is no wind the fountains do not furnish water and they have to depend on the well supply which upsets their digestions. I visited the well which is a large one 50 feet deep and found that, in addition to the windmill, there is 4 H.P. Crossley oil engine for pumping purposes. Moreover there are two covered reservoirs capable of holding 25,000 gallons. The well supplies Bois Rouge Sugar Estate as well as Grand Baie. I think that in all probability the shortage complained of in Grand Baie is due to some defective arrangement for supply. It is possible that those in charge do not sufficiently consider the needs of the village. In any case I suggest that an enquiry be made as, so far as I can ascertain, the complaint is well founded.*

Marches.

(b) The marshes are a serious problem for, in the summer, they breed out great numbers of anophelines. Even in July I found anopheline larvæ in a spring pool close to a swampy area.

Methods of dealing with swamps.

These shallow brackish marshes extend all round the northern coast of Rivière du Rempart. They are not continuous. There is a series of small swamps separated one from the other by rocky ridges. They are shut off from the sea by high ground. Their abolition is a difficult problem and yet, unless they are abolished, malaria will always be prevalent in the adjacent villages and houses. So far as I can see, apart from filling up, a work of much magnitude, the best way of dealing with them would be to link them up by piercing or trenching the intervening ridges, dig a collecting well and then pump them dry, possibly by the utilisation of wind power and discharging their water into the sea. Mr. Shand Harvey has collected literature on the subject and can supply useful information regarding the employment of windmill pumps. He might with advantage be consulted. Failing filling or pumping operations I would suggest the usual methods of clearing, oiling, stocking with larvivorous fish and trying the effect of *Culex tigripes* larvæ. In some cases benefits might result from clearing and deepening as larvæ do not flourish in deep water. Sunflower cultivation might be attempted but I am very doubtful if it would be successful in a soil containing such a large percentage of salt.

Government School, Grand Baie.

Government School.—The building, an old one, is of a good type, being built of stone. It is, however, not large enough to accommodate the pupils of whom there are 164 on the roll, with an average attendance of 91. The water supply is augmented by rain water conducted from the roof gutter to a closed tank but at present the gutter is full of holes and no rain water can be obtained. It should be repaired. The pit latrines were clean.

Grand Gaube.

GRAND GAUBE.—This fishing village of 2,023 inhabitants derives its water supply from an underground pool formed by a spring at a place called "La Cave." A well has been sunk to the pool and a pump, operated by a 5 H. P. gas engine supplies 41,818 gallons daily to a service reservoir having a total capacity of 104,500 gallons.

"La Cave" water supply.

Cap Malheureux.

CAP MALHEUREUX, a small place, also draws its supply from this source. The entrance to the cave is supposed to be closed by a door to prevent persons and animals having access to the pool, but I found the door open and clear evidence that it was not affording the necessary protection. A special memorandum (My 180/R/64 of 1.8.21) drew attention to the defect.

The pit latrine system is in force and is more cleanly than the pail system. Influenza and dysentery are said to be the commonest diseases in the Grand Gaube area, but, according to the register at the Civil Status Office, the principal causes of death are pneumonia and malaria.

Schools.

Schools.—R. C. Aided School, Grand Gaube. Pupils on roll 223. Average attendance 166. Four pit latrines are provided. Presbyterian Aided School, Roc-en-Roc. Pupils on roll 100. Average attendance 60. There are two pits latrines unprovided with covers.

Cap Malheureux R. C. Aided School. Pupils on roll 44. Average attendance 22. The single latrine pit is very shallow and is uncovered.

* Since writing the above I learn that a scheme has been prepared for supplying the villages of Grand Baie, Petit Raffray, François Camp and the Vale with water from the large well at the last named (See p. 4).

POUDRE D'OR.—When inspecting the Sanitary Office here I found that all letters are labouriously copied out by hand. A great saving of time and labour would be effected if a copying press were provided. This is true of all the sanitary offices which are very much out of date in this respect. Poudre d'Or.

It may be of interest if I give a list of the books which are kept by the Sanitary Inspector at Poudre d'Or and which have their counter-part elsewhere. They are concerned with the following :—1, Prosecutions ; 2, Building Notices ; 3, General Nuisances ; 4, Diary ; 5, Letters ; 6, Cow keepers ; 7, Milk sellers ; 8, Return of Nuisances to Government Departments ; 9, Infectious Diseases ; 10, Death Returns ; 11, Bills ; 12, Occurrence Book. Record books kept by sanitary inspectors.

How one man can be expected to keep all these records, write out copies of all letters received, supervise his sanitary guards, attend to the sanitary needs of 31,692 people over a wide area and serve four separate departments passes my comprehension. For doing so he receives a salary of Rs. 156 per mensem including war allowance and is expected to do his work *sans peur et sans reproche* and also without any modern works of reference or opportunity of improving his knowledge.

There is little to note about Poudre d'Or which has only a population of 738 people and presents the usual features so far as sanitation is concerned. The water supply comes from Ruisseau Grand Marais. I visited the spot and found the covers of the aqueduct defective. The water is liable to pollution, though the risk is doubtless small. A memorandum (My 174/R/62 of 28.7.21) was submitted on the subject. Water Supply of Poudre d'Or.

There is a pail system for the night soil, the place of disposal being the closed engrais at Mon Loisir Estate. It is of a very good type.

Schools.—R. C. Aided Schools. Pupils on roll 81. Average attendance 62. There is a two-seated latrine with a good floor. Schools.

Government School. Pupils on roll 171. Average attendance 101. The spleen index is high, for the vicinity of Poudre d'Or is very malarious owing to the presence of marshes (*vide infra*). The school building here is better than usual but the four-seated latrine was in a filthy condition and of the usual faulty type.

GOODLANDS.—This is a large inland village of 2,734 people where nothing of special importance was found. Attention, however, should be directed to the large well where a start has been made to introduce a pumping plant. Unfortunately work is now in abeyance. It should be resumed and completed and the water protected from pollution. Goodlands.

R. C. Aided School.—(St. Antoine) Pupils on roll 211. Average attendance 130. The water supply of this school is unsatisfactory. The hygiene primer in use is that by Pouzet which is very unsuitable. Crétin's should be substituted until something better is available. Well.

With the exception of LE RAVIN, a place of 3,310 inhabitants, where numerous wells of a comparatively good type are noticeable, the other small villages visited scarcely merit attention but mention may be made of two schools which were inspected. Le Ravin.

Camp Maçon Government School.—Pupils on roll 317. Average attendance 174. Poverty and illness are the chief causes of absence. The school is overcrowded and the latrine accommodation quite inadequate and unsuitable. Camp Maçon School.

R. C. Aided School, Rivière du Rempart.—Pupils on roll 283. Average attendance 62. Absences due to poverty and illness. Latrine accommodation inadequate and unsuitable. Rivière du Rempart School.

It may be noted that POINTE AUX LASCARS is supplied by a spring liable to pollution and also, that, since the marshes near Hermitage were drained, the spleen rate there has decreased by 58 per cent.

SUGAR ESTATES.—These, for the most part, conform to the usual type and presented the customary defects. The following points may be noted : At BEAU SÉJOUR there is still a little malaria traceable to the Bois Rouge Canal which requires watching. The incidence of disease, however, has greatly diminished. There are some uncovered latrines on this estate. This should not be permitted. There is an excellent dairy. The hospital presented no special features. Sugar Estates.

LABOURDONNAIS furnishes an example of the old type of coolie lines built round a square. Their ventilation is defective. The more modern type of camp lines is also present. Water is obtained from a well 150 feet in depth. There is a piggery which is well built and well arranged. A special feature of this estate is its large butter factory (*vide infra*). Neither dysentery nor ankylostomiasis is common at Labourdonnais. Beau Séjour.

The Vale. On THE VALE Estate there is a well 70 feet in depth. It supplies a large population but there is no pumping plant and the water is liable to pollution. This is the well mentioned in the foot-note on page 2. If utilised, as proposed, it will be put in proper order.

Mon Loisir (Rouillard). MON LOISIR (Rouillard) Estate.—The camp which is no longer under the control of the Immigration Department, is of a bad type. Water is stored in barrels which were found swarming with *stegomyia* larvæ. Steps were taken to abolish this nuisance.

St. Antoine. ST. ANTOINE Estate.—Here a canal 2 miles long carries the liquid refuse from the mill to the sea. The camp is fair. Some of the new lines are well built in stone. At the hospital a dispenser was found who possesses some knowledge of clinical microscopy. This is one of the two estate hospitals in Mauritius where the microscope is used. Yet there can be no doubt it should be employed regularly in every hospital in the Island. It is at least as useful as the stethoscope and no medical work can be satisfactorily carried on without it.

Baudot. BAUDOT Estate.—The coolies here suffer a good deal from malaria owing to the proximity of a large marsh. The camp is a poor type.

Belle Vue (Maurel). BELLE VUE (Maurel).—The camp lines are furnished with metal doors, an improvement on the usual type of wooden door.

Mon Loisir (Adam). MON LOISIR (Adam) Estate, possesses an hospital building of an excellent type, much the best I have yet seen and a model which might well be copied. There was, however, the usual lack of comfort in the wards. The out-buildings were good and the whole place clean and well kept.

The engrais here was a new, closed building, carefully constructed with a paved yard in front of it. Generally speaking this estate is very creditable from a medical and sanitary standpoint and it was a pleasure to inspect it.

Schoenfeld. SCHÖNFELD Estate.—At the hospital here the dispenser has also to act as accountant. He was distressed about the state of the hospital and with good reason. The wards, kitchen and mortuary were alike disgraceful. So bad was the condition that a special memorandum was submitted regarding it (My 198/R/73 of 13.8.21).

The SCHÖNFELD and ÎLE D'AMBRE Estates derive their water from the feeder Figette which comes from the St. Antoine Canal. It is liable to pollution.

Butter factories. BUTTER FACTORIES.—There are several of these places in Rivière du Rempart. That at LABOURDONNAIS Estate is an up-to-date factory with proper equipment. It is kept in a hygienic state and there is strict chemical control of the milk, all necessary tests being conducted. The Manager complains that, partly because these precautions are taken, milk is no longer brought to his factory in the same quantity as hitherto. It is diverted to local Indian factories which are badly managed and where every kind of sophistication is practised. There is, I believe, considerable truth in this statement and I feel that encouragement should be given to an institution which is doing its best to safeguard the public health.

BEAU SÉJOUR possesses a small, but excellent, butter factory which, however, is now more or less a private concern.

Indian butter factories. At LE RAVIN I was shown a butter factory owned by an Indian called Ranghall Bhagun where the conditions were very bad and which in my opinion should be closed. At Le Ravin also there is the Banwooharry butter factory. It was shut at the time of my visit but externally the place did not inspire confidence and I am told that it is not satisfactory. It should be inspected and, if found faulty, its condition should be remedied or it should be closed.

On the other hand the small butter factory at BELLE VUE owned by Mr. Lhortal is a very creditable place. Although the arrangements are more primitive than those at Labourdonnais there is little fault to be found with them and the room is fly-proof and was spotlessly clean at the time of my visit. I am told, however, that butter is purchased from Indian factories and sold as the produce of the Belle Vue factory. The matter requires investigation.

Von Moltke Rum Distillery. VON MOLTKE RUM DISTILLERY.—This distillery near Roche Noire, discharges its foul-smelling effluent by a short canal into the sea. The latter is thereby discoloured over a considerable extent and at times fish are killed. A nuisance is undoubtedly created but few people live in this neighbourhood and I can suggest no better means of disposal.

Marshes and anti-malarial works. MARSHES AND ANTI-MALARIAL WORKS.—I have already mentioned some of the coastal marshes and suggested remedial measures. These I think are applicable to all the swamps close to the sea as for example those in the vicinity of Roche Noire which, I am informed, are a fruitful source of malaria in the summer.

The lower portion of the inland marshes at Ile d'Ambre have been drained but a few more channels cut on the herring-bone principle are required. The upper portion of these marshes, separated from the lower by a tramway causeway, have not been dealt with and require attention. Ordinary drainage measures combined with clearance of grass and reeds should suffice.

Isle d'Ambre
swamps.

ISAURE Marsh is an extensive and dangerous swamp formed by the overflow of the Citronniers River owing to the presence of a dam erected by the St. Antoine Estate. Steps should certainly be taken to abolish this large anopheline-breeding area. The responsibility rests with the St. Antoine Estate and pressure should be brought to bear on the proprietor. Water for the estate should be taken at the source of the river and the dam, which is the cause of all the trouble, removed. Free drainage would thus be effected and then subsidiary works of training and canalisation could be carried into effect. The matter is an important one and no delay should be permitted in remedying the faulty conditions. I understand that representations in the past have proved futile.

Isaure marsh.

The anti-malarial works carried out in Rivière du Rempart, though not very extensive, have been successful, notably those in the neighbourhood of Hermitage Village. In the course of my inspections I find that those who decry such measures are the persons who have neglected to take any steps themselves to benefit the health of the people on whose labour they rely. It is a deplorable state of matters and I am of opinion that it is necessary for Government to take strong action and to insist that all necessary works be undertaken by those responsible. Private interests must be subordinated to the welfare of the public if any improvement is to be effected.

Good results at
Hermitage.

Necessity for
strong action.

A question of great interest and importance, to which attention must be directed, is the disappearance of *Anopheles costalis* throughout many localities during the winter months. It is conceivable that the adult female mosquitoes in certain localities hibernate during the colder season of the year. Persistent efforts should therefore be made to find hibernating mosquitoes. I have searched underground premises at the Observatory, Pamplémousses and have examined a few cow-sheds but, so far, without effect.

The question of
hibernation of
A. costalis.

Dr. Castel has agreed to instruct two of his best "moustiquiers" to carry out a careful search. If this problem could be solved it might be possible to destroy the hibernating females with most advantageous results.

Unfortunately it is difficult to find any place where *A. costalis* congregates. It is in no sense of the word a domestic mosquito and hence it may not hibernate in any places near human habitations. It appears that, unlike *A. maculipennis* the common malaria vector of Europe, it does not seek the shelter of stables and cow-sheds during the winter. It is possible that it conceals itself in the vicinity of marshes or finds a refuge in woods or undergrowth.

It is also true that it may not hibernate at all but, if so, it is not easy to account for its sudden disappearance and its equally sudden appearance in many places where fever is only rife during the summer. There are, of course, places where it breeds all the year round and perhaps it spreads quickly from these once the warm weather begins. Whatever may be the case I cannot help thinking that this is one of the crucial questions to be elucidated in Mauritius, and if there is difficulty in solving it, I believe it would pay to enlist the services of an expert entomologist. If there is no hibernation it is clear that the best time to destroy the broods is during the cold season when the nurseries are few and scattered. At that period there should be intensive work, the mosquito brigades being withdrawn in great parts from localities in which there is little or nothing for them to do and concentrated in the places where *A. costalis* is breeding.

Intensive anti-
mosquito work in
winter.

FLACQ

In this large district the following inspections were made :—

TOWNS AND VILLAGES.—Post de Flacq, Central Flacq, St. Julien, Haut de Flacq, Rivière Sèche, Grand River South East, Trou d'Eau Douce and Quatre Cocos. The region of Brisée Verdière was also traversed.

SUGAR ESTATES.—Constance-La Gaité, Union-Flacq, L'Etoile, La Lucie, Beau Champ.

SCHOOLS.—R. C. Aided School, Poste de Flacq ; C. of E. Aided School, St. Julien ; Bon Accueil School ; Government School, Central Flacq ; L'Etoile, La Commune R. C. Aided School ; Olivia R. C. Aided School ; Government School, Rivière Sèche ; Government School, Grand River South East ; Government School, Quatre Cocos.

HOSPITALS.—Government Hospital, Central Flacq and Sugar Estates Hospitals.

DISPENSARIES.—Rivière Sèche, Trou d'Eau Douce.

RAILWAY STATIONS.—Flacq, Argy.

SPECIAL WATER SUPPLIES.—La Cave (Flacq), Dubois River for Flacq but in Moka District, Vicinity of Jamblon River.

ENGRAIS.—Constance and La Gaité.

SPECIAL INSTITUTIONS.—Phoenix Rum Distillery, Infirmary, St. Julien.

Various rivers, rivulets, canals, swampy areas and anti-malarial works were also visited. The Hon. A. Duclos, C.M.G., Deputy for the District, kindly accompanied me on an inspection and furnished me with useful information.

General
conditions in
Flacq.

Flacq District, which is one of the most important districts of Mauritius, is also one of the most unhealthy and its unhealthiness is in large measure due to the presence of malaria for a great deal of major anti-malarial work still requires to be carried out. It is for the most part a region of hills and valleys, very well watered, and, where the inevitable sugar-cane does not usurp the landscape, there is much wood and undergrowth. Marshes also exist in some parts and the rainfall is heavy. Kendrick places the incidence of ankylostomiasis at 61.5 per cent. Influenza has recently been very rife in Flacq and has caused many deaths. In some parts of the district, notably at Union and Beau Champ, typhoid fever is common. Water supplies drawn from the Rivers Céré and Profonde are badly polluted and there are many shallow wells liable to contamination. The population, according to the most recent figures, is 53,466. Non-proclaimed villages devoid of sanitary facilities are numerous.

Memoranda
already
submitted.

The following memoranda were submitted as a result of the inspections :

180/R/64 of 1.8.21—Water Supplies, Grand Gaube and Roche Noire.

189/R/68 of 6.8.31—Quinine Distribution, Government School, Rivière Sèche.

190/R/59 of 6.8.21—Public Fountain, Rivière Sèche.

194/R/70 of 9.8.21—Protection of catchment areas of Water Supplies.

Sanitary Staff.

SANITARY STAFF.—Under a Sanitary Warden, who happens to be the Chief Sanitary Officer, there are a single Sanitary Inspector and two Sanitary Guards who cannot possibly cope with all that has to be done. The Sanitary Inspector works hard and has suffered greatly in health from living in a malarious district. I obtained some interesting particulars regarding his career which I quote as they have a bearing on the sanitary situation. He began life as a trader, then became a sanitary guard and was promoted inspector after nine years' service. The only training he ever had was a course of six lectures from Dr. Crétin. He had no practical training in hygiene of any kind but, for purposes of abattoir inspection, he received some practical instruction in veterinary work. His salary is Rs. 156 *per mensem* with a travelling allowance of Rs. 58.33 and he receives in addition Rs. 50 for slaughter-house inspection.

Comment on this kind of sanitary education is well-nigh superfluous. It is the old story "anyone is good enough to be a sanitary inspector." The wonder is that some of the men carry out their duties so well considering the defects in their education. No real progress can be made until the latter is placed on a sound basis.

Poste de Flacq.

POSTE DE FLACQ, once a prosperous place, is now a decadent village of some 700 inhabitants. Its sanitary needs are looked after by a non-residential sanitary guard. There is a night-soil service, 130 tubs being handled by a contractor. The engrais is at Constance, La Gaité Estate and is a very bad one. (*vide infra*). The water supply is from Rivière Dubois.

Anti-plague
measures.

A small creek serves as a harbour for coasting vessels. These do not tie up to the wharf but rats can and do get ashore from them by means of gangways and hawsers. The Inspector General of Police has kindly arranged that the local constable will see to it that necessary precautions are taken while plague persists in rats at Port Louis whence most of the craft come during the sugar season.

Anti-malarial
precautions.

The immediate surroundings of the village are highly malarious, there being extensive marshes along the Rivière du Poste. They are low-lying and their reclamation would be very costly. If there was any chance of the trade of Poste de Flacq increasing or of the place becoming an important residential quarter it might be worth while undertaking the necessary works. At present they do not appear to me to be justifiable. It would be better to

render all better-class houses mosquito-proof and to institute a regular quinine prophylaxis if this can be managed which I greatly doubt. Any wire mesh used should contain at least 90 per cent. of copper, otherwise it will speedily perish owing to the action of the sea air.

R. C. Aided School.—Pupils on roll 101. Average attendance 61. Schools. Causes of absence are poverty and illness, chiefly malaria. Pouzet's primer on hygiene is used. As stated elsewhere it is an unsuitable book. The latrines are faulty and the night-soil service often badly conducted. It appears that it is performed without payment.

CENTRAL FLACQ.—This scattered village contains 1,519 inhabitants. It possesses a good piped water supply from the River Dubois at Sans Souci in Moka to which a visit was paid. The night-soil service which is in the hands of a contractor is very unsatisfactory. This could not well be otherwise considering there is only one cart for the three villages of Poste de Flacq, Central Flacq and St. Julien! The Engrais is at Constance d'Arifat Estate. Central Flacq.
Night-soil service.

There is only one cart for the scavenging service of the three villages, a hopeless state of matters. Dust-bins are conspicuous by their absence. Scavenging service.

Attention was directed to the *Bakery* in Central Flacq. Its floor is in very bad condition. The proprietor has twice been fined Rs. 5. Naturally it is cheaper for him to sustain many such mulctings than to expend the sum required for repairs. A sleeping-room communicates with the bake-house, fowls wander about and contaminate the floor and the whole place requires cleaning and whitewashing. Bakery.

There is no market but there is a private slaughter-house just off the main street. The building is fairly good but the floor drainage passes into an adjoining cane-field into which all the bones are thrown. Slaughter house.

There are good road drains in Central Flacq and some of the premises, especially those tenanted by Mahomedans, were found to be kept in a cleanly state. It was a relief to find at the pharmacy kept by Mr. de Robillard that good arrangements were in force for the washing of empty medicine bottles.

Government School.—The building is good and commodious but requires repair as part of it is not rain-proof. Pupils on roll 299. Average attendance 187. The chief cause of absence is illness; the prevalent complaints being malaria, influenza and measles. The books on hygiene used are those of Pouzet and Crétin. The four-seated latrine for girls was in a cleanly state, that for boys was filthy. The Headmaster, who evidently takes considerable interest in matters hygienic, informed me that the tri-weekly night-soil service was badly carried out. There is an absorption pit near the standpipe for water. It was working well. School.

ST. JULIEN is a small village presenting no special features. There is a private abattoir of quite a good type and well kept. At the cemetery I found *stegomyia* larvæ in flower vases. There are many villages in the locality which was traversed on several occasions. St. Julien.

Church of England Aided School.—Pupils on roll 279. Average attendance 223. Overcrowded but going to be enlarged. There are two pit latrines, each 8 feet deep which are an improvement on the pail system. It may be explained that, as they are dark, flies do not visit them so readily. School.

HAUT DE FLACQ.—As regards this small place only the school merits attention. Haut de Flacq.

Church of England Aided School.—Pupils on roll 175. Average attendance 134. The single class room is too small. The water supply is derived from a well 15 feet deep. Latrines bad. The tubs are removed only once a fortnight! The sum of Rs. 2 is paid for this privilege. It should be noted that the school is below road level so that when there is heavy rain the yard is flooded. School.

RIVIÈRE SÈCHE is an important village with 1,269 inhabitants and a resident sanitary guard. Mr. Pastor, a member of the District Board kindly accompanied me on my inspection here. The water supply is piped from the Rivière Dubois. There is a standpipe without a tap in the village street. Water is always running and the overflow is forming a miniature swamp in an adjoining cane-field. Attention has been directed to this matter (My 190/R/69 of 6.8.21). The night-soil service is linked up with those of Grand River South East and Trou d'Eau Douce. It is supposed to be tri-weekly save for government offices which contract for a daily removal but as only one cart and 3 men are employed it is clear that the work cannot possibly be efficiently performed. The Engrais is at Beau Champ Estate. Rivière Sèche.
Night-soil service.

Scavenging
service.

For scavenging purposes there are 8 men including sweepers and one cart. The refuse is dumped at La Lucie, a very undesirable state of affairs. There is a public latrine in the village. It was found to be fairly clean but the seats are unsuitable.

Bake-house.

The bakery in all particulars resembles that at Central Flacq.

Schools.

Government School.—Pupils on roll 160. Average attendance 84. Quinine distribution is neglected in this school and a memorandum has been furnished on the subject (My 189/R/68 of 6.8.21). The latrines were undergoing much needed repairs.

R. C. Aided School.—Pupils on roll 124. Average attendance 84. There are two latrines of a bad type and the presence of flies was very noticeable.

The southern road, which more or less follows the railway line, was followed when proceeding to Rivière Sèche. In this way an important district was traversed which has recently come into prominence in connection with a new scheme of water-supply. It is, however, unnecessary to enter into details regarding it. Two of the schools seen in this locality are mentioned later.

Grand River S.E.

Of GRAND RIVER SOUTH-EAST and TROU D'EAU DOUCE little need be said. They present the usual features of coast villages. Trou d'Eau Douce is malarious owing to the presence of marshes and pools. There is a spring forming a large fresh water pool. This requires to be kept clear of weeds.

Trou d'Eau Douce

School.

Government School, Grand River South-East.—It is badly lighted and somewhat ruinous. The school was closed for the day at the time of my visit but I found the latrines filthy, the urine-pit uncovered, the yard polluted with excrement and noted that flies abounded.

Quatre-Cocos.

QUATRE COCOS.—This is a very interesting village set on a high and stony ridge and looking down upon a chain of pools and swamps which lie in a valley separated by high ground from the sea. It is difficult of access, the road to it being very bad. The people here are cleanly in their habits, possess for the most part good and attractive houses built largely of stone and appear to be of a different type to the inhabitants of the neighbouring villages. They cultivate large quantities of onions.

School.

Government School.—Pupils on roll 204. Average attendance 104. There is much malaria, infection being acquired by children living in the lower parts of the district for they come there from Belle Mare, Palmar and Mare La Chaux. Schistosomiasis is said to be common. The small hosts of *S. haematobium* must exist in the pools and swamps in this vicinity. The school is furnished with pit latrines. When these are full their contents are removed and apparently thrown anywhere.

Presence of
schistosomiasis.

Sugar Estates.

SUGAR ESTATES.—It is scarcely necessary to describe these in detail. Their camp lines and hospitals are very like those of sugar estates elsewhere. Mention may, however, be made of the hospital at Union Flacq. Here there is a small laboratory where microscopic work is conducted. There is also a midwife attached to the hospital.

L'Etoile.

L'ETOILE camp is an example of the benefit resulting from shifting coolie lines from a low-lying malarial site to more elevated and healthy ground. It has a good piped water-supply and is well laid out.

Constance
La Gaité.

CONSTANCE LA GAITÉ is a bad camp with an engrais in a ruinous condition to which fowls have access. LA LUCIE camp is rather overgrown and untidy. Its latrines are faulty and its cow-sheds are not properly drained.

La Lucie.

Beau Champ.

BEAU CHAMP is a better camp with a well built hospital. Unfortunately the male ward is badly lighted and ill-ventilated.

Taken as a whole the best feature about the Sugar Estates in Flacq is what has been done to secure good water supplies.

Schools.

SCHOOLS.—Apart from those considered in connection with villages there are others which may be mentioned because the health of the pupils gives some idea as to the health of the locality and the hygienic state of the schools in Mauritius deserves special attention.

Bon Accueil.—Pupils on roll 175. Average attendance 115. This school is served by pit latrines.

L'Etoile, La Commune R. C. Aided School.—Pupils on roll 58. Average attendance 50. Building not much better than a hut. Latrines ruinous and not used. Although the Dubois pipe line passes close to the school its water supply is derived from the polluted Grand River South East.

Olivia R. C. Aided School.—Pupils on roll 138. Average attendance 55. Building not rain-proof and very primitive. Latrines in a bad condition but water supply satisfactory. (Dubois River).

Railway Station.

RAILWAY STATIONS.—*Flacq* Railway Station was found to be fairly clean on the whole and this was also true of *Argy* where the very dark latrines were doubtless not very attractive to flies.

SPECIAL WATER SUPPLIES.—*La Cave* in Flacq is almost a replica of *La Cave* in Rivière du Rempart. It supplies water to Roche Noire. Here also the supply was not properly protected, the attendants being careless, and a memorandum dealing with this and also with some other defects was submitted (My 180/R/64 of 1.8.21). It appears that the owner of Roche Noire Estate, who permitted Government to make use of the water and introduce a pumping plant, sends men daily to draw water from the pool itself. This introduces opportunities for contamination and should be the subject of enquiry, as should the question of the water in a subsidiary cave on the other side of the high road which communicates with the pool from which water is pumped.

Special Water Supply.

La Cave.

The *Dubois River* on the Sans Souci Estate in Moka has been tapped to supply water for Flacq. I visited the intake. There is practically no risk of local pollution but the question of possible contamination of the head waters and tributary streams in the Midlands district of Plaines Wilhems from "chasse" parties should be borne in mind. (*Vide* my 193/R/70 of 9.5.21.)

Dubois River.

The *Jamblon River* which furnishes water to the upper part of Flacq is in such a remote locality that there is practically no risk of dangerous pollution.

Jamblon River.

In many of the villages in Flacq the water supply is far from satisfactory and efforts should undoubtedly be made to secure pure supplies. This should not be very difficult considering the number of hill streams with in comparatively easy reach, the upper stretches of which are in uninhabited country.

A scheme is already afoot for supplying, with pure water from the Monneron River, the villages of St. Julien, Medine, Camp de Masque, Camp Sonah, Mare Jacquot, Clemencia and Mount Barbeau.

The Monneron River rises in the government forest of Vuillemain and its waters are not polluted. The population to be supplied is estimated at 11,365 and is, therefore, of such a size as to justify a scheme of this magnitude, the details of which have already been worked out by the Director, Public Works Department.

Another important undertaking is to supply, with pure water from the Vaquoas River, above its junction with the Rivière du Rempart, a population of nearly 10,000 people inhabiting the villages of Montagne Blanche, Petit Paquet, Hewetson, Sans Souci, Lesur, Sebastopol and Clavet. The Vaquoas River also has its source in the Vuillemain forest.

I have visited the districts to be supplied and have studied the plans and details of both schemes, the second of which is concerned with Moka as well as Flacq. Both schemes appear to me to be sound and I think they should be carried into effect if funds permit.

SPECIAL INSTITUTIONS.—The "Phoenix" Rum Distillery discharges its effluent into the sea. The remarks made in connection with the Von Moltke distillery apply equally here.

Phoenix Rum Distillery.

MARSHES AND ANTI-MALARIAL WORKS.—These are matters of great importance in Flacq. A great deal has been done in the way of draining swamps and canalising streams and rivers and the results have been good both from a hygienic and economic point of view. On many areas formerly abandoned to stagnant water, reeds, rushes and wild fowl, sugar cane is now grown and the incidence of malaria has notably diminished. There still remain, however, certain marshes which in the summer are fruitful sources of malaria. The most important are:—

Marshes and Centi-amlinal works.

anti-malarial

(a) Those in the vicinity of Poste de Flacq to which reference has already been made.

Poste de Flacq marshes.

(b) Those at La Lucie and Belle Rose. The overflow of Belle Rose finds its way into La Lucie by means of a drain. The Rivière Sèche which traverses the La Lucie marsh has been properly canalised and below its junction with the Triton stream has also been sufficiently deepened. I am informed that the portion between that junction and the swampy area, if also deepened, would be able to deal with both the La Lucie and Belle Rose marshes. So far as I can see this is correct and I am of opinion that the necessary work should be carried out. I propose to include it in the list of measures the cost of which should be defrayed out of the Improvement Fund.

La Lucie and Belle Rose marshes.

(c) Those in the neighbourhood of Trou d'Eau Douce and Quatre Cocos. I am afraid these present a very difficult problem. There are many large deep pools, however, only the margins of which are likely to afford breeding places for anophelines and as a first step these margins might be cleared and trimmed at no great expense. As to the swampy areas it may be possible to drain some of them and the others must be dealt with by the measures already indicated or possibly by deep bores. (*Vide infra*). The appointment

Trou d'Eau Douce and Quatre Cocos marshes.

Special Malaria Officer of a Special Malaria Officer, as foreshadowed in my report on the Curepipe-Beau Bassin urban area, will greatly facilitate work of this kind and the measures to be taken in each individual case may, I think, be safely left in the capable hands of Dr. Castel who has already done so much in this direction. The matter will receive more detailed consideration in my final report when I am in possession of certain data and details, which are being collected. The other anti-malarial works in Flacq are chiefly those concerned with the training and canalisation of streams and rivers. This matter has already formed the subject of correspondence owing to the fact that the District Board of Flacq had approached the Government with the request that it be permitted to undertake anti-malarial works as follows :—

Work on Rivers.

Application from District Board.

(1) St. Julien.—Rivulet St. Louis and Feeder Cresson.

(2) Central Flacq.—River du Poste, Feeder Ste. Ursule, and the drains of the marsh of the same name, Feeder Ste. Anne, Rivers Céré and Coignarde and Rivulet Sarcelle.

(3) Rivière Sèche.—Rivière Sèche, Ruisseau Triton, Rivulet St. Louis and Feeder Belle Rose.

The question was referred to me and I recommended that, under existing circumstances, the Board be entrusted with this duty, provided it was prepared to proceed under Dr. Castel's guidance and with his advice. Some of this work is merely of an "upkeep" nature, but some, as already mentioned when dealing with the question of swamps, is new; the most important being that in connection with the River du Poste and the Rivière Sèche and its tributaries.

River Profonde.

So far so well, but an effort should also be made to deal with the large River Profonde, at least in those portions of its course which traverse fairly populous localities and more especially where there are estate camps in close proximity and to complete the work on the River Française near Poste de Flacq.

River Française.

Australia.

Attention should also be directed to the area known as Australia in the vicinity of which there are large villages. This is not an easy place to treat for, apart from small streams, there are depressions which fill with water after rain. I think it is possible that by deep boring, as has been carried out with success in the United States, the danger of these large pits might be averted for the deep strata are probably porous and water might readily disappear down the bore holes. The method is known as "vertical drainage."

Vertical Drainage.

This would be a cheaper and easier method than filling up and indeed, in some places, it is worth considering in connection with swamp areas. It has the great advantage of requiring practically no up-keep. The bore is made at a carefully selected spot, the water vanishes, the marsh is abolished. In this way large ponds have been obliterated in ~~Nebraska~~ at comparatively small cost. Of course such a measure is not applicable in places where the sub-soil water is near the surface but Australia is an elevated region where this does not occur and where deep boring is unlikely to reach water save at a considerable depth.

Summary of Recommendations.

SUMMARY OF THE MORE IMPORTANT RECOMMENDATIONS :

1. Appointment of a Medical Officer of Health for the two districts. He should reside in one or other of them, preferably at Central Flacq.

2. Re-organisation of the work of the Sanitary Inspectors as advocated elsewhere.

3. A second Sanitary Inspector to be appointed for the large and important Flacq District.

4. Proper office facilities, more especially a letter-copying book, to be provided for the sanitary offices.

5. Improvement of latrine system generally. Consideration should be given to the introduction of a pit-latrine system when no method of collection at present exists and its adoption in lieu of the pail system where the latter cannot be properly carried out. In this connection I would direct attention to a method which has been devised for rural districts in the United States and which is known as the Concrete Sanitary Privy Vault. It consists of a ventilated closet building containing two seats or openings each communicating with a separate, ventilated, fly-proof, water-tight vault the walls of which are rendered in cement concrete. (See plan attached). The method of use is to nail down one seat cover or close one opening and use one aperture only till the compartment is full. Then nail down the seat

Concrete sanitary privy vault.

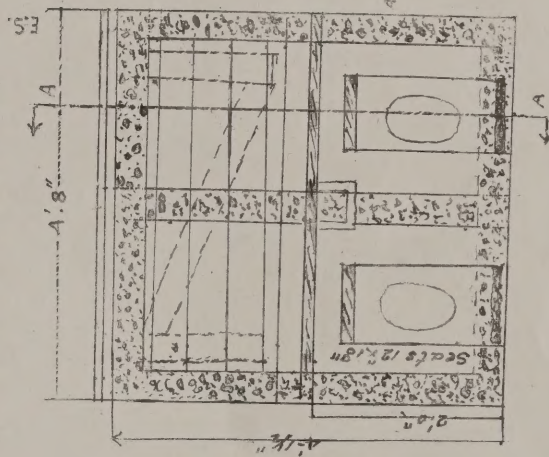
Alabama

cover or close the opening, as the case may be, over the full compartment and use only the other side till that in its turn is full. By this time the first compartment is ready for cleaning. The excreta having dried and much of the liquid having evaporated, the contents are not offensive to handle. A little dry earth or sawdust should be thrown in when the privy is used to help the evaporation of moisture. The vault contents are finally buried well away from any source of water supply. The cost of construction is soon recovered by the saving in contractor's fees and the cost of upkeep is trifling. I have submitted a separate memorandum in connection with this suggestion (My 215/R/87).

6. Coastal marshes to be dealt with on the lines indicated.
7. Further drainage work to be carried out on the Ile d'Ambre marshes (Rivière du Rempart).
8. Steps to be taken for the abolition of the Isaure Marsh (Rivière du Rempart).
9. Deepening of Rivière Sèche to get rid of the La Lucie and Belle Rose marshes (Flacq) and canalisation of upper portion of Rivière Sèche.
10. Measures to be taken for dealing with pools and swamps in the vicinity of Trou d'Eau Douce and Quatre Cocos (Flacq).
11. Extension of anti-malarial works to certain rivers in Flacq.
12. Enquiry to be instituted as regards the whereabouts of adult *A. costalis* during the cold season with a view to their destruction at that period, and more intensive anti-mosquito work to be carried on throughout the winter when there is the greatest chance of success in dealing with breeding places.
13. Completion of well at Goodlands.
14. Protection of "La Cave" water supplies in Rivière du Rempart and Flacq.
15. Steps to be taken to improve the water supply to Grand Baie and further enquiries to be instituted as regards the improvement of water supplies in Flacq generally.
16. Attention to be directed to the Indian butter factories in Rivière du Rempart, one of which, at least, should be closed.
17. Provision of a market for Central Flacq.
18. Action to be taken as regards the state of the hospital on Schoenfeld Sugar Estate.

I have the honour to be,
Sir,
Your obedient servant,

ANDREW BALFOUR.



ENLARGED SECTIONAL ELEVATION OF
CONCRETE VAULT

Concrete Vault Sanitary privy as recommended by the U.S. Public Health Service

GOVERNMENT LITHOGRAPHY — 9.21

